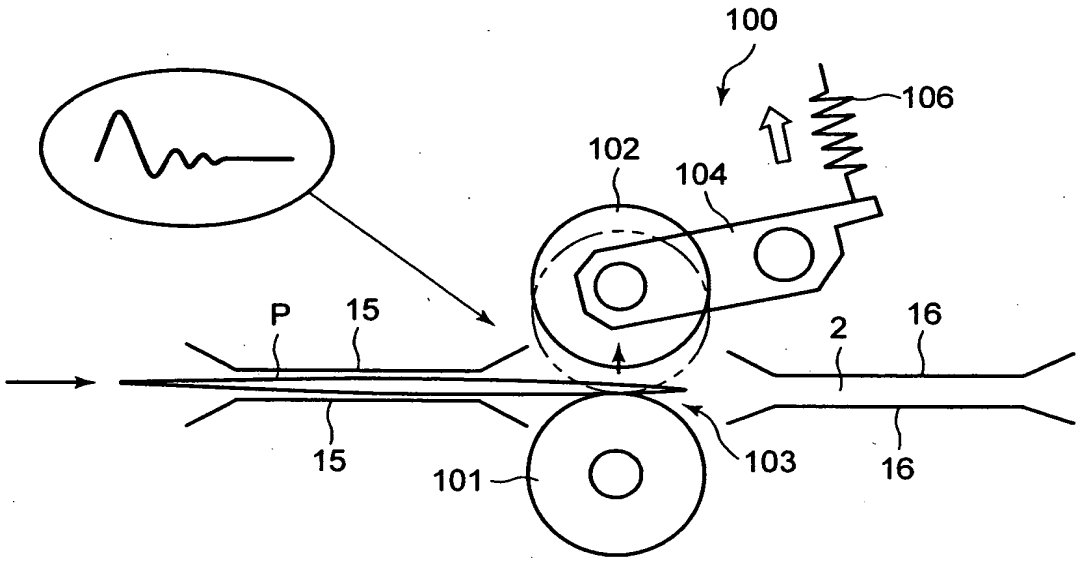

FIG. 1 PRIOR ART

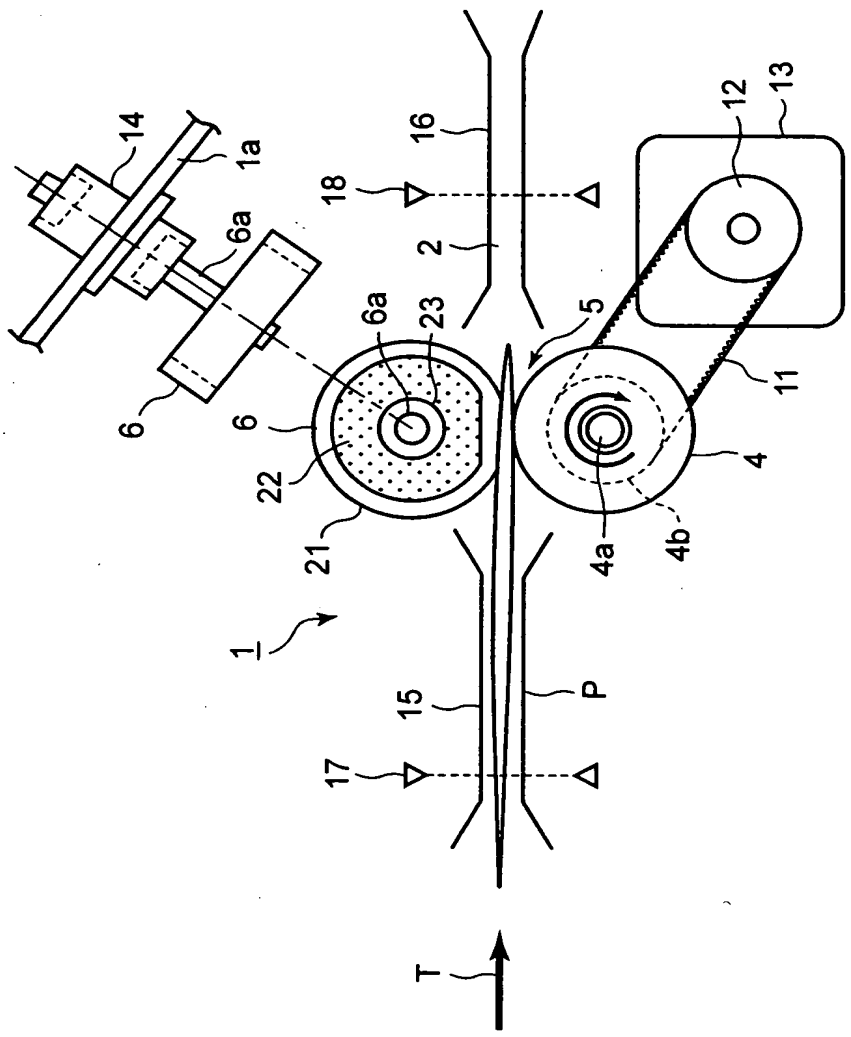

FIG. 2

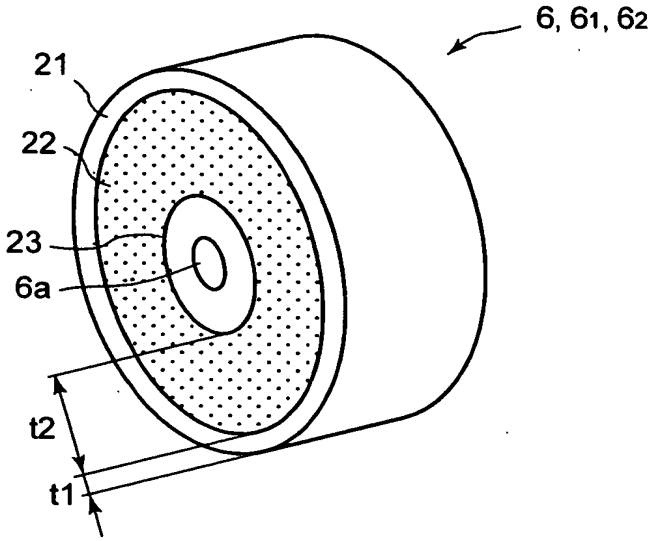

FIG. 3

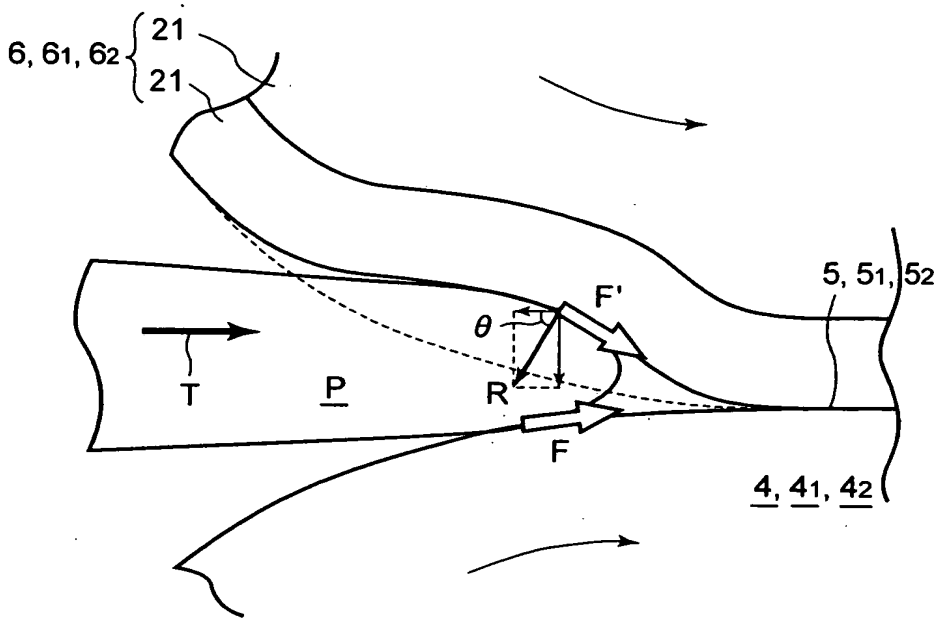

FIG. 4

Driven roller	S11	S12	S13	S14	S15	S16	S17	S18	S19	P1	P2	P3
Coefficient of dynamic friction	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Rubber thickness (mm)	2	4	6	2	4	6	2	4	6	4	4	4
Sponge hardness (Asker C)	30	30	30	40	40	40	50	50	50	-	-	-
Thrusting force (N)	-	-	-	-	-	-	-	-	-	5	20	50
Driven roller	S21	S22	S23	S24	S25	S26	S27	S28	S29	-	-	-
Coefficient of dynamic friction	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	-	-	-
Rubber thickness (mm)	2	4	6	2	4	6	2	4	6	-	-	-
Sponge hardness (Asker C)	30	30	30	40	40	40	50	50	50	-	-	-
Thrusting force (N)	-	-	-	-	-	-	-	-	-	-	-	-

FIG. 5

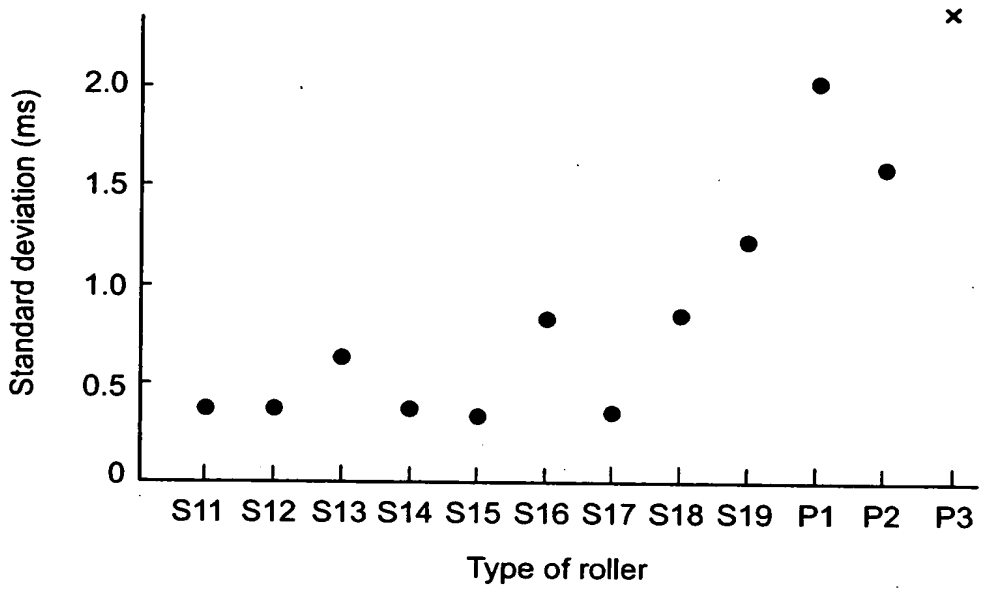
Standard deviation (ms)
2.0
1.5
1.0
0.5
0
S11 S12 S13 S14 S15 S16 S17 S18 S19 P1 P2 P3
Type of roller

FIG. 6

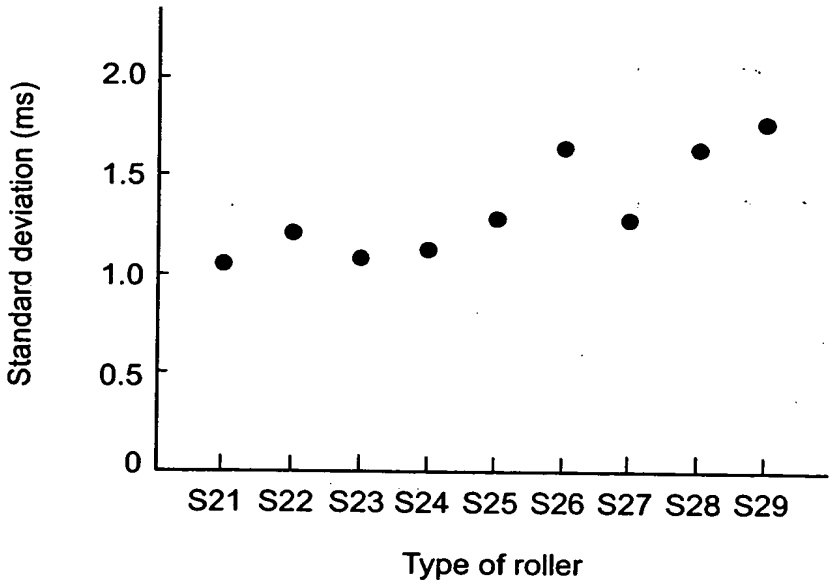
Standard deviation (ms)
2.0
1.5
1.0
0.5
0
S21 S22 S23 S24 S25 S26 S27 S28 S29
Type of roller

FIG. 7

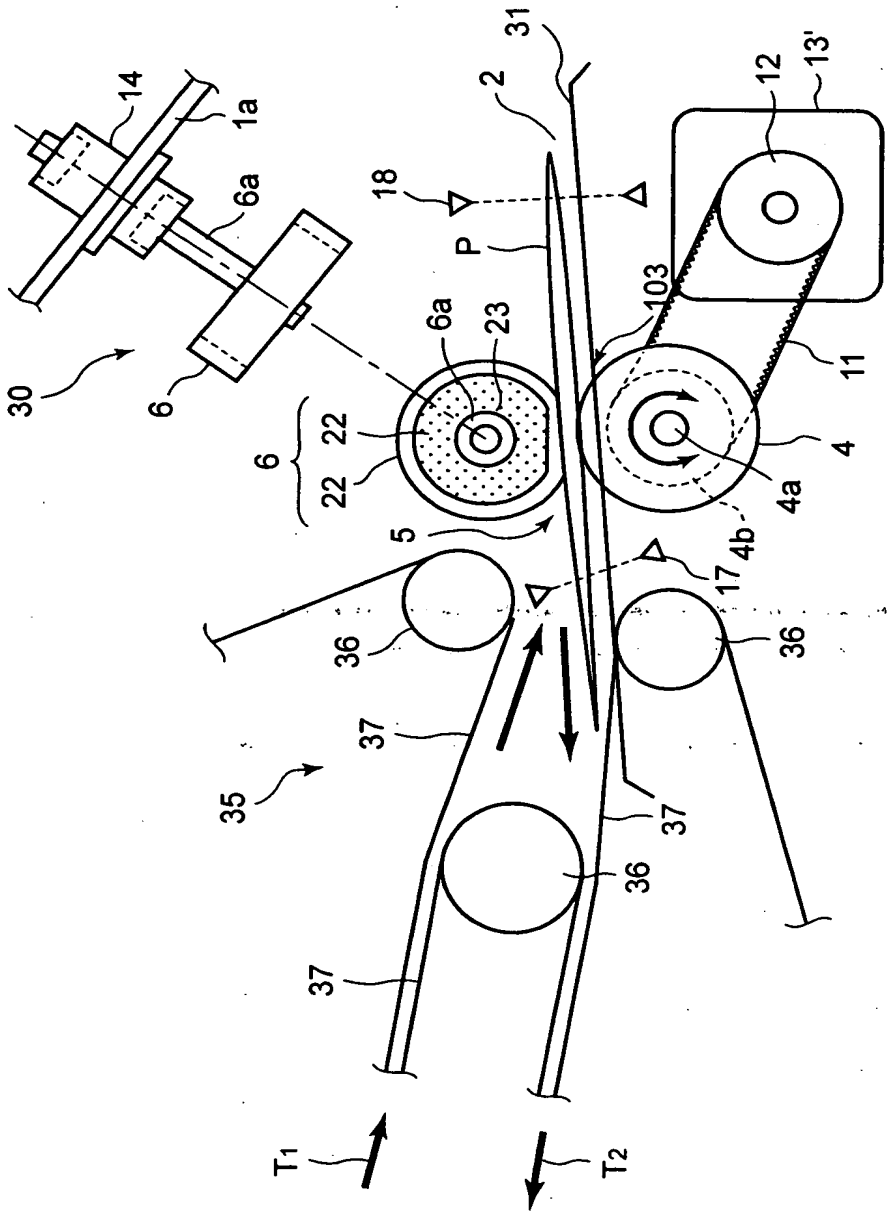
14
1a
6a
30
6
18
2
31
12
13'
P
103
6a
23
11
6
22
22
4
4a
5
4b
17
36
36
37
35
37
36
37
T1
T2

FIG. 8

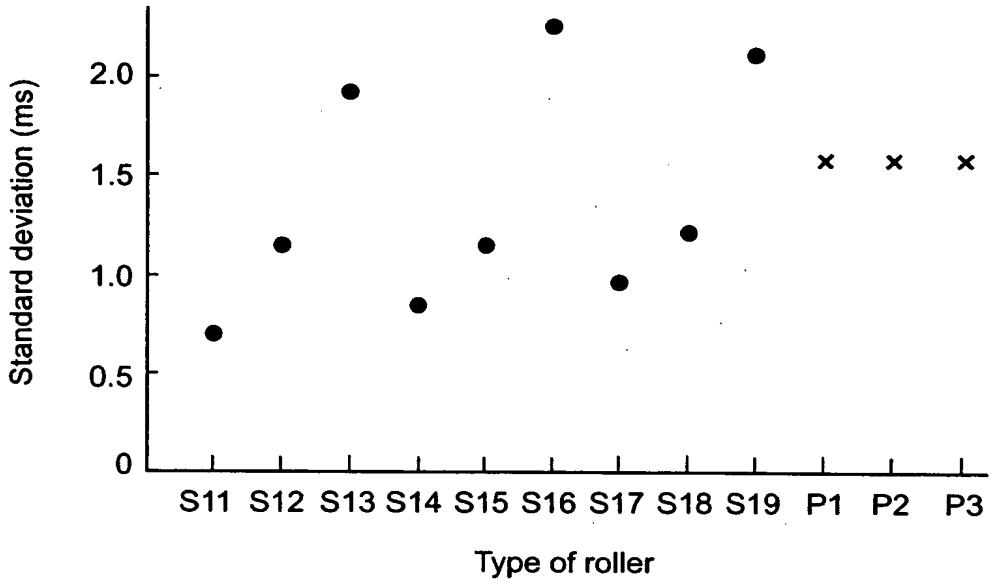
Standard deviation (ms)
2.0
1.5
1.0
0.5
0
S11 S12 S13 S14 S15 S16 S17 S18 S19 P1 P2 P3
Type of roller

FIG. 9

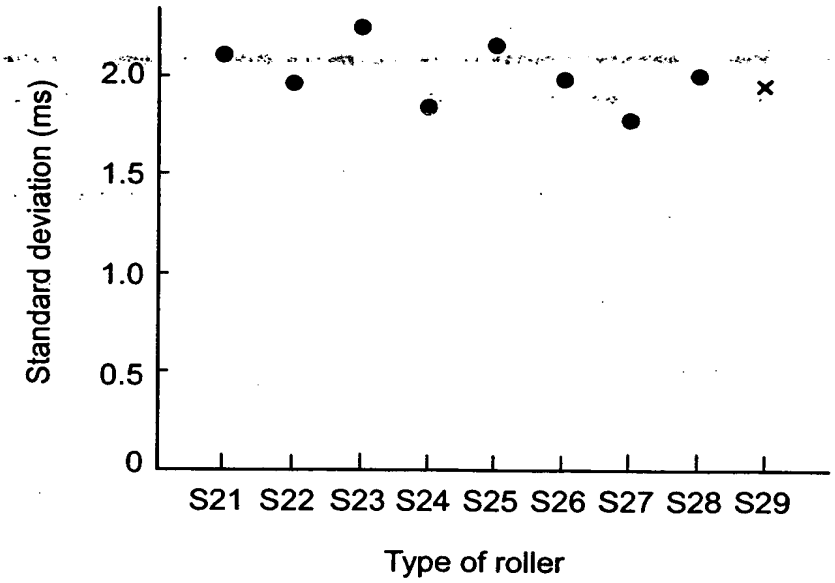
Standard deviation (ms)
2.0
1.5
1.0
0.5
0
S21 S22 S23 S24 S25 S26 S27 S28 S29
Type of roller

FIG.10

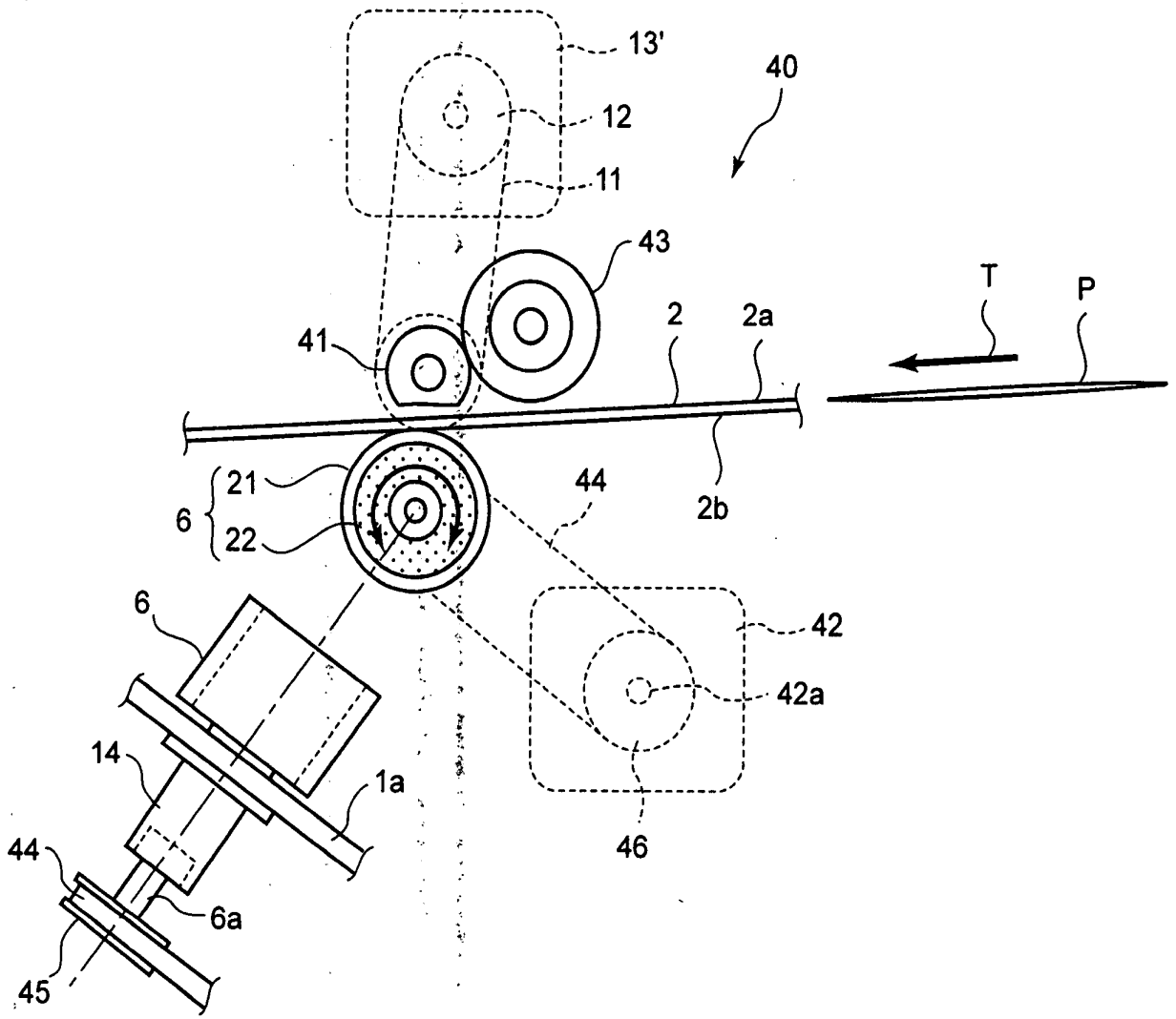

FIG. 11

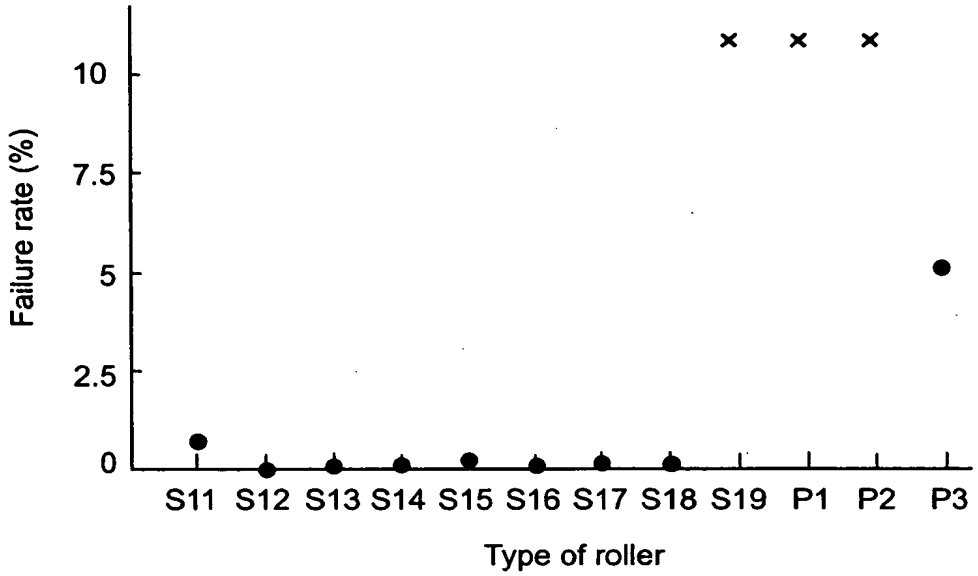
Failure rate (%)
10
7.5
5
2.5
0
S11 S12 S13 S14 S15 S16 S17 S18 S19 P1 P2 P3
Type of roller

FIG. 12

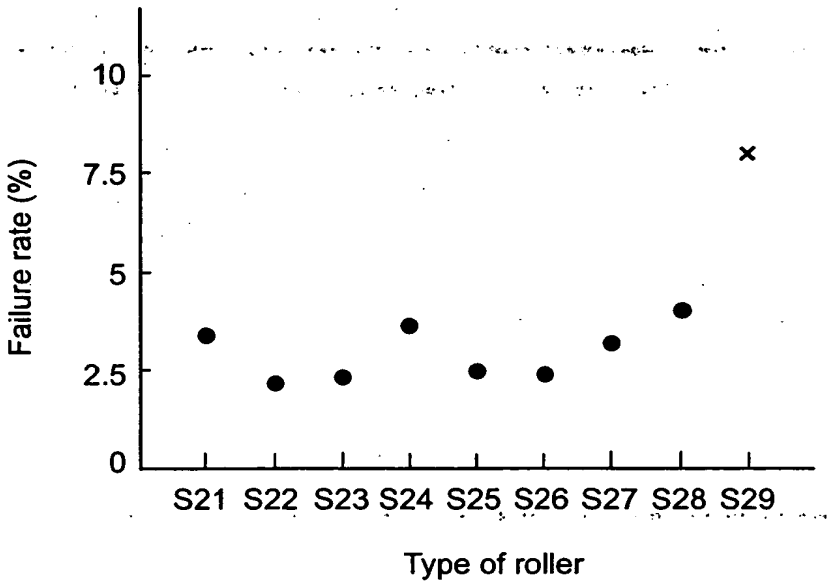
Failure rate (%)
10
7.5
5
2.5
0
S21 S22 S23 S24 S25 S26 S27 S28 S29
Type of roller

FIG.13

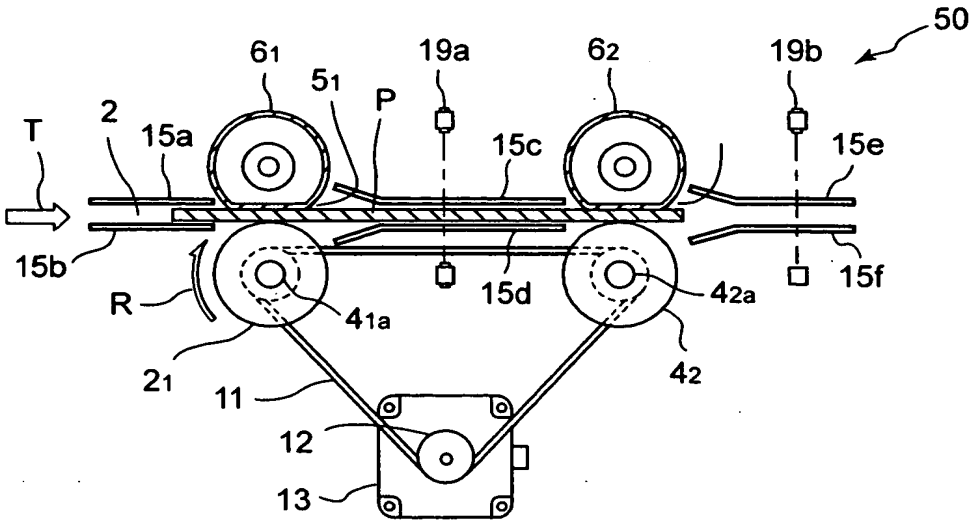
50
61
19a
62
19b
51
P
T
2
15a
15c
15e
15b
R
41a
15d
42a
15f
21
11
42
12
13

FIG. 14

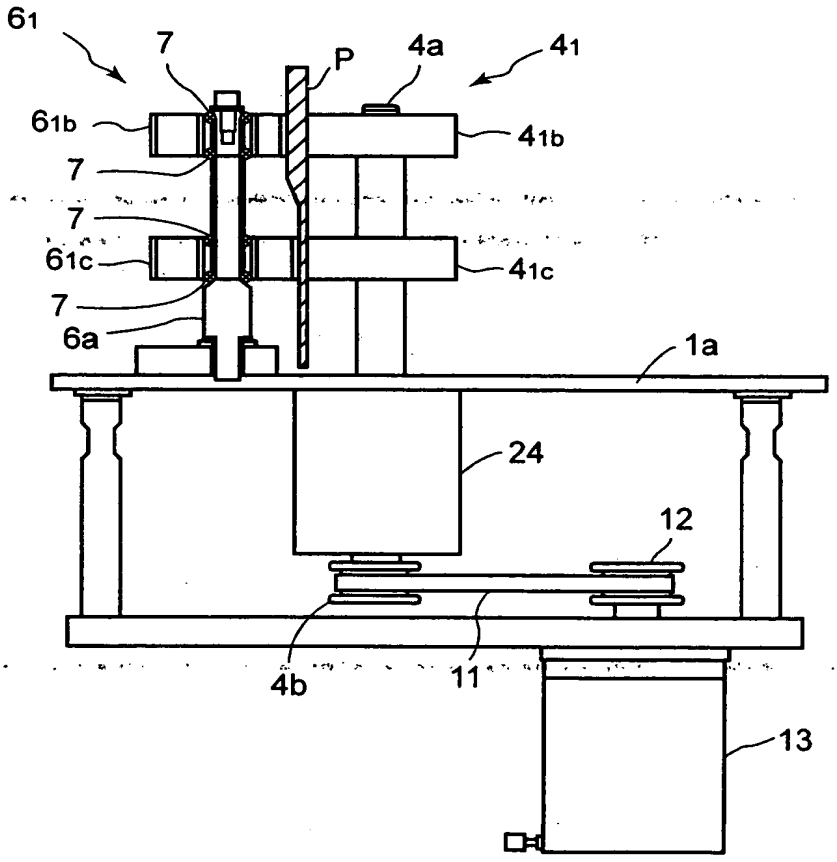
61
7
P
4a
41
61b
41b
7
7
61c
41c
7
6a
1a
24
12
4b
11
13

FIG. 15

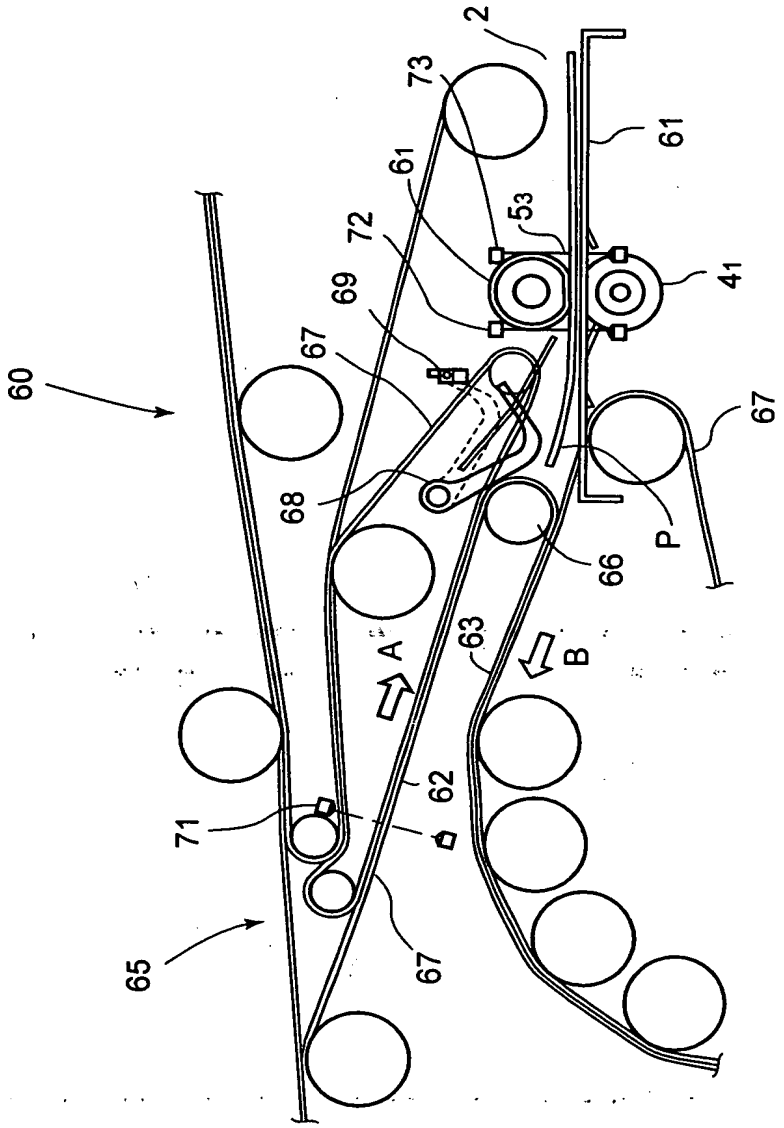

FIG. 16

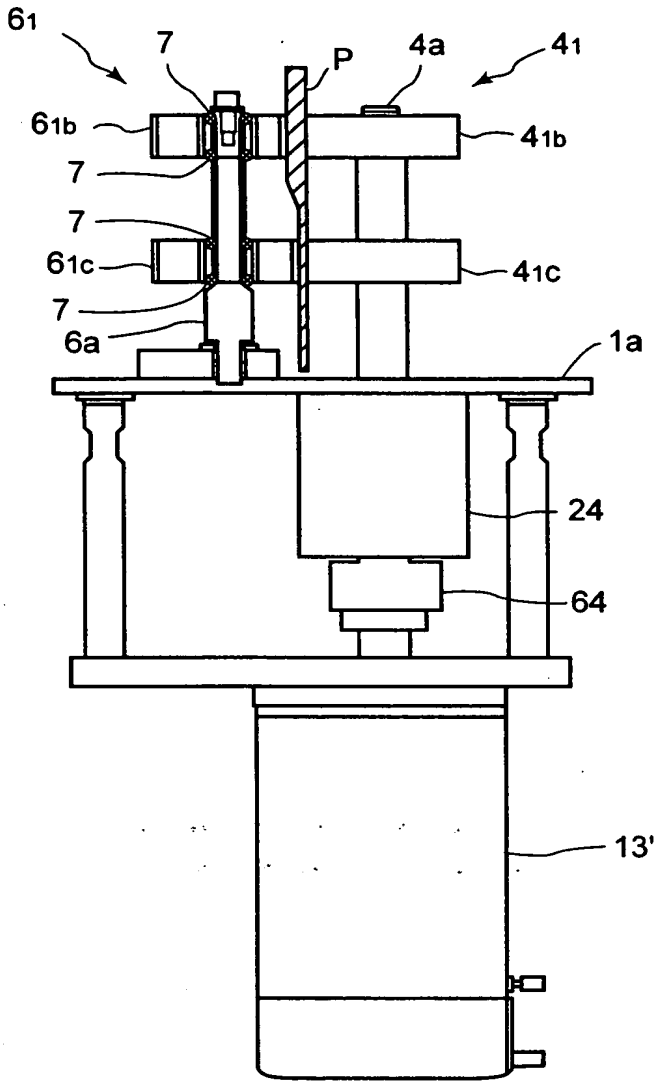

FIG. 17